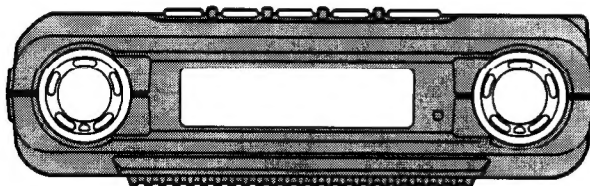




FM TRANSCEIVER
FT-1500M
OPERATING MANUAL



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Introduction

The **FT-1500M** is a deluxe, compact FM mobile transceiver providing high power output and outstanding receiver performance for the 144 MHz band. Included in the **FT-1500M**'s feature complement are:

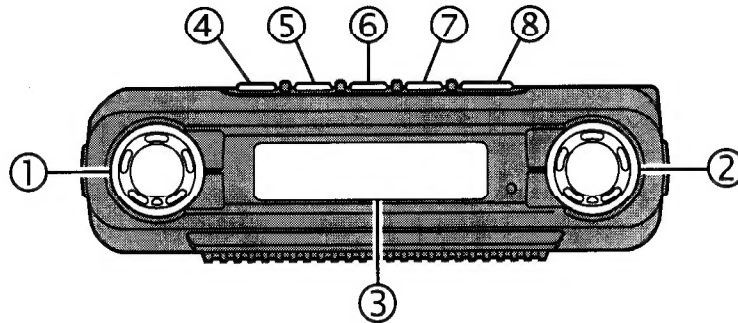
- ☐ 50 Watts of power output, with selection of four power levels for every operating situation.
- ☐ Expanded receiver coverage: 137 - 174 MHz.
- ☐ Keyboard entry of operating frequencies from the microphone.
- ☐ Outstanding packet radio capability at 1200 or 9600 bps with easy interface via a dedicated rear-panel jack.
- ☐ 130 memories which can store repeater shifts, odd repeater shifts, CTCSS tones, and 6-character Alpha-Numeric labels for easy channel recognition.
- ☐ Built-in CTCSS Encoder/Decoder circuits.
- ☐ The Smart Search feature, which automatically sweeps a band and loads active frequencies into dedicated memory banks, is ideal for identifying active repeaters when visiting a city for the first time.
- ☐ Extensive Menu system, which allows customization of a number of transceiver performance characteristics.

Additional features include a transmit Time-Out-Timer (TOT), Automatic Power-Off (APO), Automatic Repeater Shift (ARS), plus provision for reduction of the Tx deviation in areas of high channel congestion. And S-Meter Squelch circuit allows the owner to set the squelch to open at a programmable setting of the S-Meter, thus reducing guesswork in setting the squelch threshold.

Congratulations on your purchase of the **FT-1500M**! Whether this is your first rig, or if Yaesu equipment is already the backbone of your station, the Yaesu organization is committed to ensuring your enjoyment of this high-performance transceiver, which should provide you with many years of satisfying operation. Yaesu's dealer network and technical support personnel stand behind every product we sell, and we invite you to contact us should you require technical advice or assistance.

We recommend that you read this manual in its entirety prior to installing the **FT-1500M**, so that you fully understand the capabilities of your new transceiver.

Front Panel Controls & Switches



① **VOL Knob**

This control adjusts the volume level of the receiver's audio. Clockwise rotation increases the volume level.

② **DIAL**

This 24-position detented rotary switch is used for tuning, memory selection and most function settings. Note that the microphone's UP/DOWN buttons duplicate the tuning functions of the Main Dial.

③ **Display**

The display consists of segmented digits which indicate operating frequency, status of functions, alpha/numeric memory labels, and MENU functions.

④ **MHz**

This button allows tuning in 1-MHz steps (the MHz digits will blink on the display). If receiving on a memory, pressing this button the first time activates the Memory Tune (MT) mode, and pressing it again enables 1-MHz steps.

Press and hold in this key for one second to activate the Set (MENU) Mode.

⑤ **REV**

During split-frequency operation, such as through a repeater, this button reverses the transmit and receive frequencies.

Press and hold in this key for one second to activate the Dual Watch feature, described in the Operation chapter ("PRI" will be displayed on the LCD, indicating "Priority Channel" monitoring).

⑥ **LOW**

Toggle this button while receiving to select high/low transmitter power (50/25/10/5 watts). If you first press and hold in this key for one second while receiving on a memory, pressing this button then toggles the display between indication of the frequency and the channel's Alpha/Numeric label.

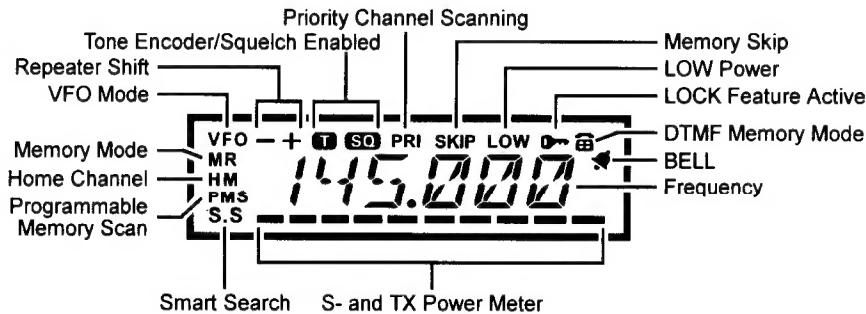
⑦ **D/MR**

This button selects the operation modes: VFO mode, Memory mode, and HOME channel. Press and hold in this key for one second to activate the Memory Storage mode.

⑧ **PWR Switch**

This is the main "ON/OFF" switch for the transceiver. Press *and hold in* this key to turn the transceiver on. Press *and hold in* this key for one second to turn the transceiver off.

LCD & Microphone Switches (MH-48A6J)



① PTT Switch

Press this switch to transmit, and release it to receive.

② Keypad

The desired operating frequency may be entered directly from the keypad.

③ DWN Button

Press this button momentarily to tune downward by one synthesizer step. Hold this button in for one second to start scanning.

④ UP Button

Press this button momentarily to tune upward by one synthesizer step. Hold this button in for one second to start scanning.

⑤ LOCK Switch

Slide this switch upward to lock the microphone's buttons.

⑥ LAMP Switch

Slide this switch upward to activate the back-lighting for the microphone's keys.

⑦ P1 Button

The default function for this key is "SQLOFF" (Squelch Off).

In the European version, press this button to transmit a 1750 Hz Burst Tone for repeater access.

⑧ P2 Button

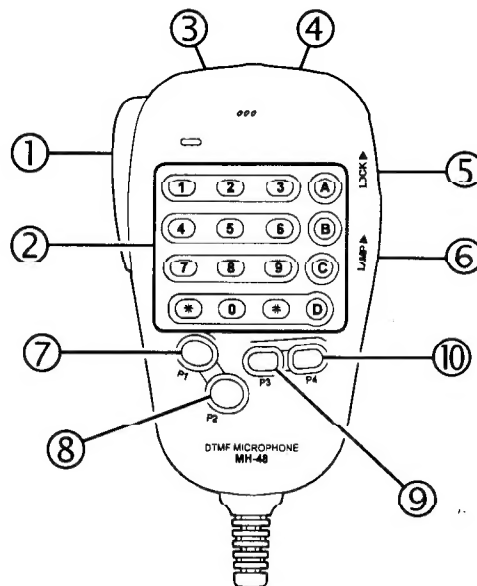
The default function for this key is "S SRCH" (Smart Search).

⑨ P3 Button

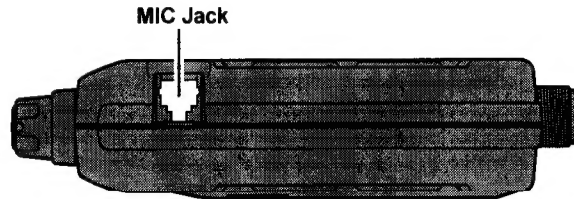
The default function for this key is "T SRCH" (Tone Search).

⑩ P4 Button

The default function for this key is "WX CH" (Weather Channel Bank).

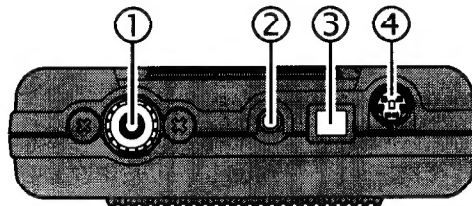
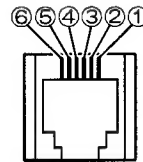


Side & Rear Panel Connector



This 6-contact modular jack accepts transmit audio, tone call (Burst), or Dial/Memory selection, and Scanning control from the microphone.

Pin 1: Sw 2 (Multi-function switching)
Pin 2: Sw1 (Multi-function switching)
Pin 3: +9V
Pin 4: GND
Pin 5: Microphone Input
Pin 6: PTT (Clone)



① **ANT Coaxial Socket**

Connect a resonant 144-MHz antenna to this type-M (SO-239) socket, using 50- Ω coaxial cable and a type-M (PL-259) plug.

② **EXP SP Jack**

This 2-contact 3.5-mm phone jack provides receiver audio output for an optional external speaker. The audio impedance is 4 Ohms, and the level varies according to the setting of the front panel's VOL control. Inserting a plug into this jack disables audio from the transceiver's internal speaker.

③ **13.8V DC Cable Pigtail w/Fuse**

This is the power supply connection for the transceiver. Use the supplied DC cable to connect this pigtail to the car battery or other DC power supply capable of at least 10 Amperes (continuous duty). Make certain that the red lead connects to the positive side of the supply. The fuse in the DC Cable is rated at 15 Amps (fast-blow).

④ **DATA Jack**

This six-pin mini-DIN jack accepts AFSK or FSK input from a Terminal Node Controller (TNC); it also provides fixed-level Receiver Audio Output, Push-To-Talk (PTT), and Ground lines. See page 8 for specifications for each pin of this jack.

Accessories & Options

ACCESSORIES SUPPLIED WITH THE FT-1500M

MH-48A6J DTMF Keypad Microphone

MMB-74 Mobile Mounting Bracket

DC Power Cord w/ Fuse

Spare 15 A Fuse

Operating Manual

Warranty Card

AVAILABLE OPTIONS FOR YOUR FT-1500M

SP-7 External Loudspeaker

MLS-100 High-Power External Speaker

FP-1023A (23 A) AC Power Supply, Switching Regulator Type (U.S.A. only)

FP-1030A (25 A) AC Power Supply

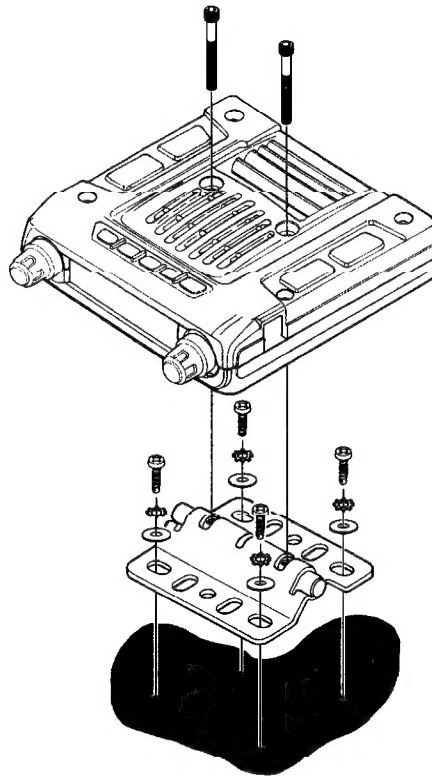
Availability of accessories may vary: some accessories are supplied as standard per local regulations and requirements, others may be unavailable in some regions. Check with your Yaesu dealer for additions to the above list.

Installation

MOBILE INSTALLATION

The **FT-1500M** must only be installed in vehicles having a negative ground electrical system. Mount the transceiver where the display, controls, and microphone are easily accessible, using the supplied **MMB-74** mounting bracket.

The transceiver may be installed in any position, but should not be positioned near a heating vent nor anywhere where it might interfere with driving (either visually or mechanically). Make sure to provide plenty of space on all sides of the transceiver so that air can flow freely through the heatsink. Refer to the diagrams showing proper installation procedures.



Transceiver Installation

- ☐ Choose a mounting location with sufficient clearance for the transceiver. Using the mounting bracket as a template for the mounting holes, use a 4.8 mm (3/16") bit to drill the mounting holes, and secure the mounting bracket with the screws and washers (see diagram).
- ☐ Position the transceiver on the bracket so that the holes in the top are aligned with those in the bracket, and bolt the transceiver into place using the supplied screws.

Installation

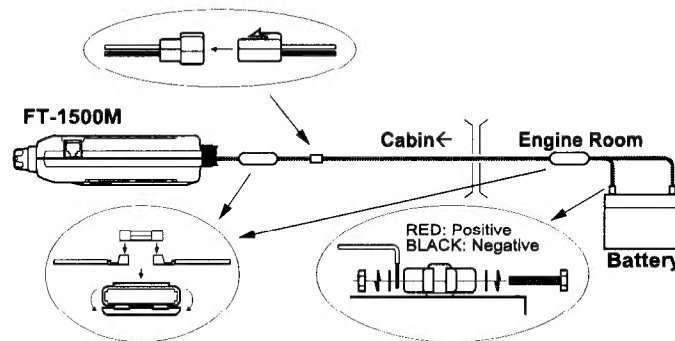
MOBILE POWER CONNECTIONS

To minimize voltage drop and avoid blowing the vehicle's fuses, connect the supplied DC power cable directly to the battery terminals. *Do not attempt to defeat or bypass the DC cable's fuse—it is there to protect you, your transceiver, and your vehicle's electrical system.*

Warning!

Never apply AC power to the power cable of the FT-1500M, nor DC voltage greater than 15.2 Volts. When replacing the fuse, only use a 15-A fast-blow type. Failure to observe these safety precautions will void the Limited Warranty on this product.

- ☐ Before connecting the transceiver, check the voltage at the battery terminals while revving the engine. If the voltage exceeds 15 Volts, adjust the vehicle's voltage regulator before proceeding with installation.
- ☐ Connect the **RED** power cable lead to the **POSITIVE (+)** battery terminal, and the **BLACK** power cable lead to the **NEGATIVE (–)** terminal. If you need to extend the power cable, use #12 AWG or larger insulated, stranded copper wire. Solder the splice connections carefully, and wrap the connections thoroughly with insulating electrical tape.
- ☐ Before connecting the cable to the transceiver, verify the voltage and polarity of the voltage *at the transceiver end of the DC cable* using a DC voltmeter. Now connect the transceiver to the DC cable.



Mobile Speakers

The optional **SP-7** External Speaker includes its own swivel-type mounting bracket, and is available from your Yaesu dealer.

Other external speakers may be used with the **FT-1500M**, if they present the specified 4-Ohm impedance and are capable of handling the 3.5 Watts of audio output supplied by the **FT-1500M**.

Installation

BASE STATION INSTALLATION

The **FT-1500M** is ideal for base station use as well as in mobile installations. The **FT-1500M** is specifically designed to integrate into your station easily, using the information to follow as a reference.

AC Power Supplies

Operation of the **FT-1500M** from an AC line *requires* a power source capable of providing at least 10 Amps continuously at 13.8 Volts DC. The **FP-1025A** and **FP-1030A** AC Power Supplies are available from your Yaesu dealer to satisfy these requirements. Other well-regulated power supplies may be used, as well, if they meet the above voltage and current specifications.

Use the DC power cable supplied with your transceiver for making power connections to the power supply. Connect the **RED** power cable lead to the **POSITIVE (+)** power supply terminal, and connect the **BLACK** power cable lead to the **NEGATIVE (-)** power supply terminal

Packet Radio Terminal Node Controller (TNC)

The **FT-1500M** provides a convenient rear-panel **DATA** jack for easy connections to your TNC. This connector is a standard mini-DIN connector.

The **FT-1500M**'s **DATA** jack connections are optimized for the data transmission and reception speed in use. In accordance with industry standards, the signal levels, impedances, and bandwidths are significantly different on 9600 bps as opposed to 1200 bps. If your TNC does not provide multiple lines to accommodate such optimization, you may still be able to utilize your TNC, if it is designed for multiple-radio use, by connecting the TNC "Radio 1" port to the 1200 bps lines on the **FT-1500M**, and the "Radio 2" port to the 9600 bps lines.

The pin connections of the Data connector are shown below.

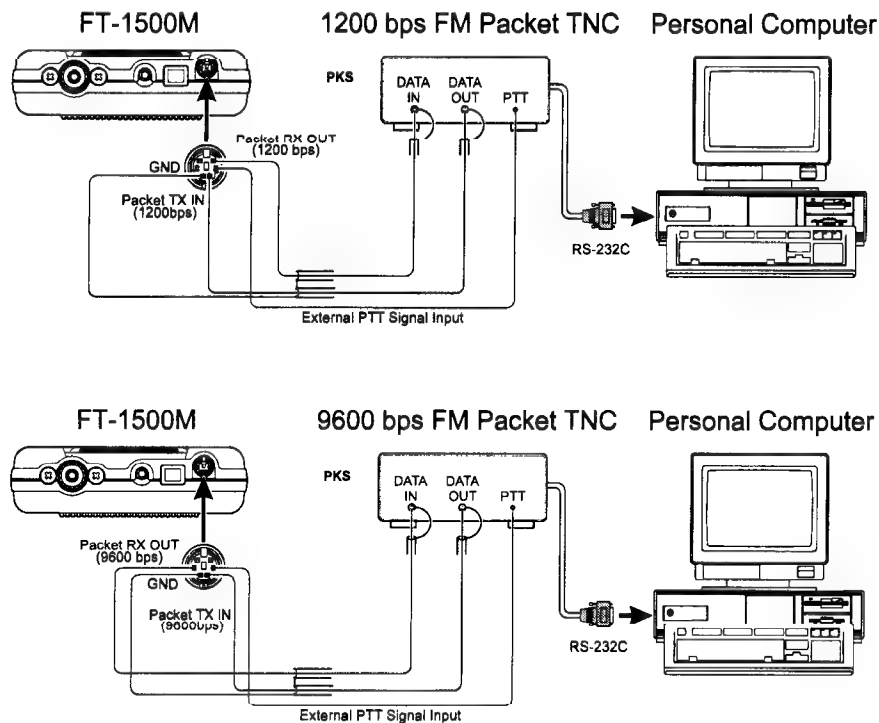
Pin	Label	Notes
1	DATA IN	Typ. 1Vp-p/600Ω
2	GND	-
3	PKT PTT	GND:TX OPEN:RX
4	DATA OUT 9600 bps	Typ. 600mVp-p/10 kΩ
5	DATA OUT 1200 bps	Typ. 200mVp-p/600Ω
6	SQL	Carrier IN:5 V None carrier:0 V

Installation

Note that 9600 bps packet transmit-deviation adjustment is very critical to successful operation, and can only be accomplished using a calibrated deviation meter (such as that found on an FM Service Monitor used in a communications service center). In most cases, the Packet Data Input level (set via a potentiometer inside the TNC) must be adjusted to provide a deviation of ± 2.75 kHz (± 0.25 kHz). Check with your packet node's sysop if you have any questions about the appropriate deviation level for your network.

The setting of the 1200 bps Packet Data Input level is much less critical, and satisfactory adjustment to the optimum ($\pm 2.5 \sim \pm 3.5$ kHz) deviation can usually be done "by ear" by adjusting the TNC's 1200 bps TX Audio Level potentiometer so that the outgoing packets (as monitored on a separate VHF or UHF receiver) are approximately the same level as (A) the DTMF tones or (B) the 1750 Hz Burst tone produced by the **MH-48A6J** microphone.

Typical connections to a TNC are shown below.



Finally, note that the ("PCKT") MENU selection allows you to enable or disable the microphone during packet operation. Normally, the default setting ("Microphone Disabled during Packet TX") is appropriate; when the microprocessor detects **PTT** input from the Data connector, the microphone will be disabled.

Basic Operation

POWER ON AND OFF

Press the **[PWR]** switch for one second to turn the radio on.

To turn the radio off, press and hold in the **[PWR]** switch for one second. This “press and hold” requirement helps minimize the chance of accidental switch-off of the transceiver.

ADJUSTING THE VOLUME LEVEL

Rotate the **VOL** control to adjust the receiver volume. Clockwise rotation increases the audio output level.

SQUELCH SETUP

The Squelch system is designed to keep the receiver quiet until a signal is received. The Squelch should be adjusted to the point where the background noise is just silenced; any “higher” setting will reduce the receiver’s sensitivity to weak signals.

To adjust the setting of the Squelch system:

- ① Rotate the Main Dial knob to select a clear frequency (where no signals are present).
- ② Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “SQL.”
- ③ Press the **[MHz]** key momentarily, then rotate the Main Dial knob to select the squelch threshold level (OFF, or 1 to 15). While you are making this adjustment, you will be able to hear the background noise appear when the Squelch setting is too low. The best sensitivity will be realized when the Squelch is set to one number past the point where noise is muted.
- ④ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

TRANSMITTING

To transmit, simply close the **PTT (Push To Talk)** switch on the microphone when the frequency is clear. Hold the microphone approximately 25 mm (1”) from your mouth, and speak into the microphone in a normal voice level. When your transmission is complete, release the **PTT** switch; the transceiver will revert to the receive mode.

Basic Operation

TUNING: THE “DIAL” (VFO) MODE

This mode is used for selecting a frequency utilizing the Main Dial knob and or microphone's [UP] and [DWN] buttons to allow the Variable Frequency Oscillator (VFO) to tune in the selected step size. When scanning in the VFO mode, the same steps are used as in manual tuning.

Clockwise rotation of the Main Dial knob increases the operating frequency, while counter clockwise rotation tunes toward a lower frequency.

To move frequency rapidly (in 1 MHz steps), press the [MHz] key momentarily, then rotate the Main Dial knob. The MHz digits of the frequency display will blink while “1 MHz Tuning” is enabled. When you have selected the desired “1 MHz” frequency digit, press the [MHz] key momentarily once more, then resume normal tuning using the Main Dial knob.

DIRECT KEYPAD FREQUENCY ENTRY

The keypad of the **MH-48A6J** DTMF Microphone may be used for direct entry of the operating frequency. It also may be used for recall of memory channels.

To enter a frequency from the MH-48A6J keypad:

- ① Press the [D/MR] key, if necessary, to set the transceiver into the VFO mode.
- ② While receiving on any VFO frequency, enter the digits of the desired frequency.
For example, to enter 146.520 MHz, press [1] → [4] → [6] → [5] → [2] → [0].
A high-pitched “beep” will confirm each key closure as you enter the digits; the final “beep” will be of longer duration, to confirm that the frequency entry is complete.
- ③ The [#] key may be used to abbreviate the entry procedure. Pressing the [#] key sets the current digit and all following digits to “0” to complete the entry.
For example, to enter 146.500 MHz, press [1] → [4] → [6] → [5] → [#].
To enter 145.000 MHz, press [1] → [4] → [5] → [#].

Recalling memories is equally simple (see page 24 for details on memory operation). You can recall a memory from the **MH-48A6J** from any operating mode: VFO, Home, or Memory.

- ① Press the Channel Number you wish to recall, then press the [*] key.
For example, to recall Memory Channel 2, press [2] → [*]. To recall Channel number 125, press [1] → [2] → [5] → [*].
- ② To return to the VFO mode, press the front panel's [D/MR] key or the microphone's [D] key.
- ③ If you are in the Memory Recall mode, you can enter a new operating frequency directly, as described above for VFO operation. However, you will observe that a “MR” indicator will be blinking appear at the left side of the display; this indicates that you have switched to the “Memory Tune” mode, which is described in detail on page 25.

Basic Operation

CHANGING THE TRANSMITTER POWER LEVEL

Four power output levels are available on this transceiver: 5 watts (LOW1), 10 watts (LOW2), 25 watts (LOW3) and 50 watts (HIGH).

To change the power level, press the [**LOW**] key to select one of the four available power settings. These power levels will be stored in memory registers, at the time of memory storage (see page 23 for details on Memory operation).

During transmission, the Bar Graph will deflect in the display, according to the power output selected.

CHANGING THE CHANNEL STEPS

Tuning steps are factory preset to default increments which are appropriate for the country to which this radio is exported.

To change to another step size, use the following procedure:

- ① Press and hold the [**MHz**] key for one second, then rotate the Main Dial knob to select "STEP."
- ② Press the [**MHz**] key, then rotate the Main Dial knob to select the desired step size: 5.0/10.0/12.5/15.0/20.0/25.0/50.0/100 (kHz).
- ③ Press and hold in the [**MHz**] key for one second to save the new setting and exit to normal operation.

LOCK FEATURE

In order to prevent accidental frequency change or inadvertent transmission, various aspects of the **FT-1500M**'s keys and switches may be locked out. The possible lockout combinations are:

KEY:	Just the front panel keys are locked out
DIA:	Just the front panel DIAL is locked out
K + D (KEY + DIAL) :	Both the DIAL and Keys are locked out
PTT:	The PTT switch is locked (TX not possible)
K + P (KEY + PTT) :	Both the keys and PTT switch are locked out
D + P (DIAL + PTT) :	Both the DIAL and PTT switch are locked out
ALL:	All of the above are locked out

To lock out some or all of the keys:

- ① Press and hold in the [**MHz**] key for one second, then rotate the Main Dial knob to select "LOCK."
- ② Press the [**MHz**] key, then rotate the Main Dial knob to choose between one of the locking schemes as outlined above.
- ③ Press and hold in the [**MHz**] key for one second to save the new setting and exit to normal operation.

Basic Operation

REPEATER OPERATION

The **FT-1500M** includes a host of convenience features which making operation on amateur repeaters both efficient and enjoyable.

Repeater Splits

This transceiver offers three methods of setting up split-frequency operation on repeaters:

- (1) Manual selection of preset repeater shifts;
- (2) Automatic Repeater Shift (ARS), providing automatic activation of repeater shifts within designated repeater frequency subbands; and
- (3) Independently stored transmit and receive frequencies (typically not corresponding to established repeater frequency shifts).

(1) Standard Repeater Shifts

The **FT-1500M** has been shipped ready for use on the repeater shift typically used in your country. For customers in the United States, for example, the standard repeater shift will be 600 kHz, and the direction of the shift will depend on the part of the band in which you are operating.

To activate the standard shift manually:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "RPTR."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired shift direction: -RPT, +RPT, or SIMP (Simplex).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

With repeater shift activated, you can temporarily reverse the transmit and receive frequencies by pressing the front panel's **[REV]** key. Use this feature to display the transmit frequency *without transmitting*, and to check the strength of signals on a repeater uplink frequency (so as to determine whether or not a particular station is within "Simplex" range, for example).

Changing the Default Repeater Shift

The repeater offset is usually set to 600 kHz from the factory. You can change the offset by using following procedure, if needed:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "SHIFT."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to set the desired offset. Note that the resolution of the "standard" repeater shift is to the nearest 50 kHz multiple.
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Basic Operation

Note: Do not use the above procedure if you just want to operate on one “odd split” frequency. Use the “Independent Transmit/Receive Frequency” mode, as described in section (3) below.

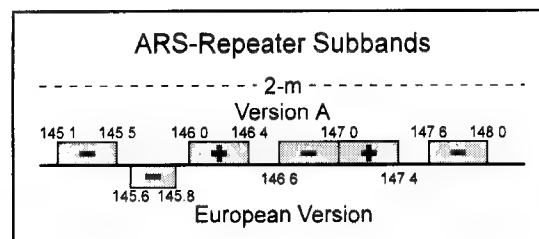
(2) Automatic Repeater Shift (ARS)

The ARS (Automatic Repeater Shift) feature in the **FT-1500M** allows easy and convenient repeater operation by automatically activating the repeater shift function whenever you tune to a standard repeater sub-band. The ARS function is preset at the factory to conform to the standards for the country to which it is exported.

The ARS function is enabled at the factory. To disable it:

- ① Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select “ARS.”
- ② Press the [MHz] key, then rotate the Main Dial knob to change the display to “OFF.”
- ③ Press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

To enable the ARS function again, select “ON” in step ② above.



(3) Separate Transmit Frequency Memories

All memory channels can store independent receive and transmit frequencies, to accommodate occasional non-standard offsets with greater frequency resolution than is available using the “standard” shift feature.

Here is the procedure for storing an “odd split” frequency pair into a memory. A full discussion of memory channel storage and recall is found in the next section.

- ① First store the receive (repeater output) frequency. In the VFO mode, tune the transceiver to the desired receive frequency. Now press and hold in the [D/MR] key for one second.
- ② Within five seconds of pressing the [D/MR] key, use the Main Dial knob (or the microphone’s [UP]/[DWN] buttons) to select the memory channel number on which you wish to store the frequency pair. If you see an Asterisk (*) by any channel number, it means that the channel currently has no data written on it (i.e. the channel is “free”).

Basic Operation

- ③ Now press the **[D/MR]** key again, this time momentarily, to store the receive frequency into the selected memory.
- ④ Next, store the transmit (repeater input) frequency. Since you are still in the VFO mode, tune the transceiver to the desired transmit frequency.
- ⑤ Now press and hold in the **[D/MR]** key for one second.
- ⑥ Within five seconds of releasing the **[D/MR]** key, rotate the Main Dial knob to select the same memory channel number as used in step ③ above.
- ⑦ Press and hold in the **PTT** switch, then press the **[D/MR]** key while holding in the **PTT** switch. This will not cause transmission, but rather it will instruct the transceiver that you are programming a separate transmit frequency into memory.

When an “odd split” memory is recalled, when you press the **PTT** switch you will observe the display changing to indicate the repeater’s uplink frequency. Note also that the display shows “- +” in the upper left-hand corner; this indicates that an “odd” (non-standard) shift has been stored on this channel.

Advanced Operation

SUPPLY VOLTAGE DISPLAY

When you turn on the radio, the current DC supply voltage will be indicated on the display for 2.5 seconds. After this interval, the display will resume its normal indication of the operating frequency.

To view the supply voltage at any time during operation, use the following procedure:

- ① Press and hold the **[MHz]** key for one second, then rotate the Main Dial knob to select “DC IN.”
- ② Press the **[MHz]** key momentarily to display the current DC supply voltage on the LCD.
- ③ Press and hold in the **[MHz]** key for one second to exit to normal operation.

KEYPAD BEEPER

A key/button beeper provides useful audible feedback whenever a button is pressed. Each key and button has a different beep pitch, and each function has a unique beep combination. The beep volume level is controlled by the radio’s **VOL** control.

If you want to turn the beeper off (or back on again):

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “BEEP.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the display to “OFF.”
- ③ Press and hold the **[MHz]** key for one second to save the new setting and exit to normal operation.

DISPLAY BRIGHTNESS

The **FT-1500M** display illumination has been specially engineered to provide high visibility with minimal disruption of your “night vision” while you are driving.

The brightness of the display is manually adjustable, using the following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “DIMR.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob. You will observe the brightness of the display changing. Ten levels of “dimming” are available, as well as “OFF” (no illumination).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Advanced Operation

RF SQUELCH

A special “RF Squelch” feature is provided on this radio. This feature allows you to set the squelch so that only signals exceeding a certain *S-meter level* will open the squelch.

To set up the RF squelch circuit for operation, use the following procedure:

- ① Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select “RF SQL.”
- ② Press the [MHz] key momentarily, then rotate the Main Dial knob to select the desired signal strength level for the squelch threshold (OFF, or 1 to 10).
- ③ Press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

Note: The receiver’s squelch will open based on the highest level set by the two squelch systems (Noise Squelch and RF Squelch).

AUTOMATIC POWER-OFF (APO) FEATURE

The “Automatic Power-Off” (APO) feature will turn the radio completely off after a user-defined period of **PTT** or key/button inactivity. If you do not press any front panel keys or buttons, rotate the Main Dial knob, use the microphone’s keys and buttons, or transmit, and so long as the transceiver is not scanning or engaged in priority monitoring, the radio will shut itself off after the specified time period. This feature is useful in minimizing battery drain in a mobile installation if you forget to turn the transceiver off when you leave your vehicle.

To activate the APO feature, use the following procedure:

- ① Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select “APO.”
- ② Press the [MHz] key, then rotate the Main Dial knob to select the desired “switch-off” time (1 to 12 hours, or OFF).
- ③ Press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

Advanced Operation

TRANSMITTER TIME-OUT TIMER (TOT)

The “Time-Out Timer” (TOT) feature is designed to force the transceiver into the “receive” mode after a preset time period of continuous transmission (the default is 6 minutes). This feature prevents your transceiver from transmitting a “dead carrier” for a long period of time in the event that the microphone **PTT** switch is accidentally locked in the “TX” condition

The Time-Out Timer’s “switch-to-receive” time may be adjusted, in one minute increments, for any period between 1 and 60 minutes. To change the default (6 minute) time setting:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “TOT.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired time interval (between 1 and 60 minutes, or OFF).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

WEATHER BROADCAST RECEPTION

The **FT-1500M** includes a unique feature which allows reception of weather broadcasts in the 160-MHz frequency range. Ten standard Weather Broadcast channels are pre-loaded into a special memory bank.

To listen to the Weather Broadcast Channels:

- ① Press the **[P4]** key to recall the Weather Broadcast channel mode.
- ② Turn the Main Dial knob to select the desired Weather Broadcast channel.
- ③ If you wish to check the other channels for activity by scanning, just press the **PTT** switch, or press and hold the **[UP]** or **[DWN]** key for one second.
- ④ To exit to normal operation, again press the **[P4]** key. Operation will return to the VFO or Memory channel you were operating on before you began Weather Broadcast operation.

You can also append an alpha-numeric “Tag” (label) to a Weather Broadcast channel. See page 24.

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
WX 1	162.550MHz	WX 5	162.450 MHz	WX 9	161.775 MHz
WX 2	162.400 MHz	WX 6	162.500 MHz	WX 10	163.275 MHz
WX 3	162.475 MHz	WX 7	162.525 MHz	-	-
WX 4	162.425 MHz	WX 8	161.650 MHz	-	-

Advanced Operation

PROGRAMMABLE MICROPHONE KEYS (P1/P2/P3/P4)

Default **FT-1500M** key functions have been assigned (at the factory) to the microphone's **[P1]**, **[P2]**, **[P3]**, and **[P4]** buttons. These may be changed by the user, if you wish to define another function for a particular key or keys.

To change the assignment of a key's function:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to the Menu Item corresponding to the key to be assigned a function **[PRG P1]**, **[PRG P2]**, **[PRG P3]**, or **[PRG P4]**.
- ② Press the **[MHz]** key momentarily, then rotate the Main Dial knob to select the function you wish to assign to the key or button you selected in the previous step. The available choices are:

SQLOFF	Opens the Squelch to allow un-muted reception.
S SRCH	Initiates Smart Search scanning.
TONE	Select the CTCSS mode.
T SRCH	Initiates scanning for an unknown CTCSS tone.
T CALL	Activates 1750 Hz Tone Burst.
RPTR	Selects the Repeater Shift direction.
DC IN	Indicates the DC Supply Voltage.
DIMR	Setting of the front panel display's illumination level.
WX CH	To listen to a Weather Broadcast Channel.
SKIP	Enable/Disable Skipping of a channel during scanning.
- ③ Press the **[MHz]** key momentarily to lock in the new setting.
- ④ Rotate the Main Dial knob to select another programmable key or button to modify, if desired, from the remaining Menu items. Follow the procedure outlined above.
- ⑤ Press and hold in the **[MHz]** key for one second to save the new setting(s) and exit to normal operation.

MICROPHONE KEYS (A/B/C/D)

The right column of the 16-key pad on the **MH-48A6J** microphone contains the **[A]**, **[B]**, **[C]**, and **[D]** keys.

During transmission, these keys provide DTMF tones which sometimes are used for repeater control purposes.

During reception, these keys replicate the actions of the top panel's command keys, allowing you to issue identical commands either from the microphone or the top panel. The key assignments are shown below:

MH-48A6J Key	[A]	[B]	[C]	[D]
Top Panel Key	[MHz] (SET)	[REV] (DW)	[LOW] (A/N)	[D/MR] (MW)

Advanced Operation

Accordingly, if you want to change frequency in 1 MHz steps, press the microphone's **[A]** key momentarily, then rotate the Main Dial knob or press the **[UP]** and **[DOWN]** keys. To enter the Set (Menu) mode, press and hold in the microphone's **[A]** key for one second.

TRANSMITTER MICROPHONE GAIN AND DEVIATION CONTROL

You can reduce the microphone input level and transmitter bandwidth when operating on tightly-clustered frequencies (channel spacing of 12.5- or 15-kHz). This will reduce the transmitter deviation, thus minimizing interference to other users.

To reduce the microphone input level:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select **"W/N DV."**
- ② Press the **[MHz]** key, then rotate the Main Dial knob to change the display to **"NARROW."**
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

To restore the normal (higher) microphone input level, select **"WIDE"** in step ② above.

TONE CALLING (1750 Hz)

In European versions of the **FT-1500M**, the default setting of the **[P1]** key is **"T CALL,"** whereby pressing **[P1]** causes a 1750 Hz repeater access tone to be transmitted. If you own a non-European version of the **FT-1500M**, but plan on visiting a country which requires a 1750 Hz tone for repeater access, you may set up one of the Programmable Keys for 1750 Hz Tone operation. See page 19 for details.

Once the desired Programmable Key has been designated for Tone Calling operation, press that key to transmit the 1750 Hz repeater access tone.

TONE SQUELCH MODES

Repeater systems often require an access signal for activation of the repeater. These access tones are often required so as to reduce false activation of the repeater by random noises or other signals on the band. Additionally, these systems can allow silent monitoring of busy channels until a call directed to your radio is received, offering less disruption to family activities, etc.

CTCSS (Continuous Tone Coded Squelch System)

This system superimposes a continuous, subaudible tone on your transmitted audio. When decoded at the other station, the CTCSS signal triggers their squelch to open and receive your transmission. Some "closed" repeaters use this to limit access, or to prevent signals intended for other repeaters (with the same input frequency) in fringe areas from locking up the repeater. There are 50 selectable CTCSS tones provided in the **FT-1500M**.

Advanced Operation

To use CTCSS, both stations must be on the same frequency, and must have selected the same CTCSS tone.

To activate CTCSS operation:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “TONE.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired squelch type from the following:

T (Encode) : Appears when the CTCSS tone generator is activated for transmission only.

TSQ (Encode/Decode) : Appears when the CTCSS Tone Squelch is activated for both TX and RX (only signals “Encoded” with the matching tone will open your radio’s squelch).

- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Now that you have selected the Tone Mode to be used, you need to select the CTCSS tone frequency that you and the other station(s) have agreed to use:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “TN FRQ.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to choose the desired CTCSS tone.
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

CTCSS settings may be stored in any memory register at the time of frequency programming. To change a memorized tone or tone system, just recall the memory channel, reset the tone or function, and store the memory again. If you activate CTCSS on a PMS memory, it will be active when that memory pair is used to start PMS scanning or tuning.

CTCSS TONE FREQUENCY (Hz)												
67.0	69.3	71.9	74.4	77.0	79.7	82.5	85.4	88.5	91.5	94.8	97.4	100.0
103.5	107.2	110.9	114.8	118.8	123.0	127.3	131.8	136.5	141.3	146.2	151.4	156.7
159.8	162.2	165.5	167.9	171.3	173.8	177.3	179.9	183.5	186.2	189.9	192.8	196.6
199.5	203.5	206.5	210.7	218.1	225.7	229.1	233.6	241.8	250.3	254.1	-	-

Advanced Operation

TONE SEARCH SCANNING

In operating situations where you don't know the CTCSS tone being used by another station, you can command the radio to listen to the incoming signal and scan in search of the tone being used.

Before you begin the tone search, please check the (programmable) setting of the microphone's **[P3]** button; it should be set to "T SRCH" for proper operation.

To scan for the CTCSS tone in use:

- ① Set the radio up for the CTCSS operation.
- ② Press the **[P3]** button on the microphone momentarily to start scanning for the incoming CTCSS tone.
- ③ When the radio detects the correct tone, it will halt on that tone, and audio will be allowed to pass.
- ④ Press and hold in the **[MHz]** key for one second; the CTCSS tone detected will be stored as the "current" tone, so it may be used for memory storage purposes. It can be viewed by accessing Menu (TN FRQ).
- ⑤ Press and hold in the **[MHz]** key for one second to exit to normal operation.

CTCSS BELL PAGING

CTCSS Bell Paging adds an alert ringer to CTCSS tone squelch operation, for added convenience. When you receive a call with a matching CTCSS tone, the ringer will sound to alert you to the presence of the incoming call.

- ① Set the transceiver up for CTCSS Decode ("TSQ") operation, as described previously.
- ② Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "BELL."
- ③ Press the **[MHz]** key, then rotate the Main Dial knob to change the display to "BEL 1," "BEL 3," "BEL 5," "BEL 8," or "BEL RPT." These selections determine how many times the Bell will ring when the incoming call is received ("BEL RPT" produces continuously-repeating rings).
- ④ To de-activate CTCSS Bell operation, select "BEL OFF" in step ③ above.

Calls without a matching CTCSS tone will be ignored during CTCSS Bell operation.

Note that other stations do not need to have the CTCSS Bell function to call you; they can just use standard CTCSS encoding.

When you reply to a CTCSS Bell call, you may want to turn off the Bell function, or else the transceiver will ring every time your squelch opens.

You can store the CTCSS Bell Paging function into a memory, along with the CTCSS tone and encode/decode state.

Memory Operation

The **FT-1500M** provides a wide variety of memory system resources. These include:

- ☐ 130 "Standard" memory channels, numbered "1" through "130." Alpha-Numeric labels of up to six characters each may be appended to any memory.
- ☐ A Home channel, allowing storage and quick recall of one prime frequency.
- ☐ Nine sets of band-edge memories also known as "Programming Memory Scan" channels, labeled "L1/U1" through "L9/U9".

MEMORY STORAGE

To store a frequency into memory:

- ① In the VFO mode, select the desired frequency, repeater shift, CTCSS tone, and Tx power level.
- ② Press and hold in the **[D/MR]** key for one second. The display will show *CH nnn , where * indicates that the channel currently does not have anything memorized on it; nnn is the channel number. The **FT-1500M** will automatically select the next-available "free" channel, for your convenience.
- ③ Within five seconds of pressing the **[D/MR]** key, use the Main Dial knob or the microphone's **[UP]/[DWN]** buttons to select the desired memory channel for storage of this frequency. If you see an Asterisk (*) by any channel number, it means that the channel currently has no data written on it (i.e. the channel is "free").
- ④ Press the **[D/MR]** key again, this time momentarily, to store the displayed data into the selected memory channel slot. The memory label will stop blinking, and the display will now revert to display of the VFO frequency which you just stored
- ⑤ You are still in the VFO mode, so you may repeat the above process to store other frequencies into other memory channel slots.

MEMORY RECALL

From the VFO mode, momentarily press the **[D/MR]** key once to activate the "MR" (Memory Recall) mode.

When more than one memory has been stored, use the Main Dial knob to select a memory for operation. Alternatively, the microphone's **[UP]** and **[DWN]** buttons may be used to step or scan through the available memories. When using the microphone's buttons, press and immediately release the button to move one channel up or down; press and hold the **[UP]** or **[DWN]** button for one second to begin memory scanning.

While you are operating in the MR mode, the "MR" notation will appear at the left side of the display.

Memory Operation

MEMORY RECALL FROM MH-48_{A6J} MICROPHONE

While operating in the VFO, Home Channel (see recto), or Memory Recall mode, the keypad of the **MH-48_{A6J}** may be used for direct recall of memory channels.

To do this, press the Channel Number you wish to recall, then press the [*****] key.

For example: To recall Memory Channel 5, press [**5**] → [*****].

To recall Channel number 118, press [**1**] → [**1**] → [**8**] → [*****].

LABELING MEMORIES

You may wish to append an alpha-numeric “Tag” (label) to a memory or memories, to aid in recollection of the channel’s intended use (such as a club name, etc.). This is easily accomplished using the “Set” (Menu) mode.

- ① Recall the memory channel onto which you wish to append a label.
- ② Press and hold in the [**MHz**] key for one second, then rotate the Main Dial knob to select “ALPH.”
- ③ Press the [**MHz**] key momentarily to enable programming of the label.
- ④ Rotate the Main Dial knob to select the first character (number, letter, or symbol) in the name you wish to store, then press the [**REV**] key to move on to the next character.
- ⑤ Again rotate the Main Dial knob to select the next number, letter, or symbol, then press the [**REV**] key to move on to the next character’s slot.
- ⑥ Repeat step ⑤ as many times as necessary to complete the name tag for the memory, then press and hold in the [**MHz**] key for one second to save the A/N (Alpha-Numeric) name entry and exit to normal operation.

During “MR” (Memory Recall) operation, press and hold in the [**LOW**] key (or the microphone’s [**C**] key) for one second to activate the alpha-numeric channel name. Repeatedly pressing and holding in the [**LOW**] key will toggle operation between “Frequency” and “Label” display.

Alpha-tag Charactor																									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X		
Y	Z	()	+	-	=	*	/	Δ	√	Σ	∫	∅	1	2	3	4	5	6	7	8	9	spc		

TO TURN ON THE ALPHA-NUMERIC MEMORY NAME DISPLAY

If you are in the “MR” mode, press and hold the [**LOW**] key for one second to replace the frequency display with the Alpha-Numeric Label.

Memory Operation

HOME CHANNEL MEMORY

A convenient one-touch “Home” channel memory is available to simplify return to your most-often-used frequency. This memory does not appear in the regular memory bank, to simplify operation.

To recall the Home channel while in the MR mode, just press the **[D/MR]** key momentarily. From the VFO mode, press **[D/MR]** twice. While you are operating on the Home channel, an “HM” notation will appear at the left side of the display.

The factory default frequency for the Home channel is 144.000 MHz. You can re-program the Home channel in a manner identical to that used for the regular memories:

- ① From the VFO mode, tune in the frequency you wish to store, and set all repeater shifts and other data just the way you do for “normal” memory channel storage.
- ② Press and hold in the **[D/MR]** key for one second, then press the **[REV]** key momentarily to store the new Home channel.

MEMORY OFFSET TUNING

Once you have recalled a particular memory channel, you may tune off that channel, as though you were in the VFO mode.

- ① With the **FT-1500M** in the “MR” mode, select the desired memory channel.
- ② Press the **[MHz]** key momentarily.
- ③ Now rotate the Main Dial knob, as desired, to tune to a new frequency. This new frequency may be stored in a new memory register, if you like, using the procedures described earlier.
- ④ If you wish to return to the original memory frequency, press the **[D/MR]** key momentarily. Any offset tuning will be discarded, and the original memory contents will appear on the display.

MEMORY ONLY MODE

Once memory channel programming has been completed, you may place the radio in a “Memory-Only” mode, whereby VFO and Home channel operation are impossible. This may be particularly useful during public-service events where a number of operators may be using the radio for first time, and ultimate simplicity of channel selection is desired.

To place the radio into the Memory-Only mode, turn it off. Now press and hold in the **[MHz]** and **[D/MR]** key while turning the radio on. The VFO and Home channel will now be disabled.

To return to normal operation, repeat the above power-on procedure.

Memory Operation

MASKING MEMORIES

With 149 total memories available, there frequently are situations where you may desire to “Mask” certain memorized frequencies. The procedure for deleting a channel is quite simple:

- ① If you do not have the “CH NUM” Menu item set to “ON,” do so now so as to simplify recognition of a particular memory channel number.
- ② Press and hold in the [D/MR] key for one second.
- ③ Rotate the Main Dial to select the channel to be “Masked.” Note that Memory Channel 1 may not be hidden.
- ④ Press the [LOW] button. This will cause the display to shift to Memory Channel 1, and the previously-selected memory will be masked (but not “erased”).
- ⑤ To “Unmask” a hidden memory, repeat the above procedure: press and hold in the [D/MR] key for one second, rotate the Main Dial to select the masked memory’s number, then press [LOW] to restore the memory channel’s data.

Scanning

The **FT-1500M**'s scanning capability provides the operator with many convenient methods of rapid frequency navigation

BASIC SCANNER OPERATION

Before activating the scanner, make sure that the Squelch is set to silence the background noise when no signal is present. If noise is being heard, the scanner will not function (because the radio will "think" that it is on a "Busy" channel).

Scanning may be started or stopped using the microphone's **[UP]** and **[DWN]** buttons. The following techniques are used during scanning operation:

- ① Pressing and holding in either the **[UP]** or **[DWN]** button for one second in the VFO mode will cause upward or downward band scanning, respectively, to begin.
- ② Pressing and holding in either the **[UP]** or **[DWN]** button for one second in the Memory Recall mode will cause memory channel scanning toward a higher- or lower-numbered memory channel, respectively.
- ③ Scanning pauses when a signal opens the squelch, and the decimal point on the display will blink. You can choose one of three scan-resume modes (described later).
- ④ To halt the scan manually, the easiest way is to push the **PTT** switch on the microphone momentarily (no transmission will occur while you are scanning).

The scan may also be halted manually by pressing the microphone's **[UP]** or **[DWN]** button, or the **[D/MR]** key on the front panel of the radio.

SCAN-RESUME OPTIONS

Three scan-resume modes are available on the **FT-1500M**:

BUSY: In this mode, the scanner will remain halted for as long as there is carrier present on the channel; after the carrier drops at the end of the other station's transmission, the scanner will resume.

HOLD: In this mode, the scanner will halt on a signal it encounters. It will not restart automatically; you must manually re-initiate scanning if you wish to resume.

5SEC: In this mode, the scanner will halt for five seconds only, after which scanning will resume (whether or not the other station is still transmitting).

To change the scan-resume mode:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "SCAN."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired scan-resume mode (BUSY, HOLD, or 5SEC).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Scanning

MEMORY SKIP SCANNING (MR Mode)

When you have some continuously-active channels (like Weather broadcasts) in memories, you may wish to skip them for scanning, but still have them available for manual selection.

To select a memory to be skipped during scanning:

- ① Recall the memory channel to be skipped.
- ② Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select "SKIP."
- ③ Press the [MHz] key, then rotate the Main Dial knob to select "SKIP."
- ④ Press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

To re-enable a "Skipped" memory channel, select "SKPOFF" in step ③ above.

PREFERENTIAL MEMORY SCAN

The **FT-1500M** also allows you to set up a "Preferential Scan List" of channel you can "flag" within the memory system. These channels are designated by a *blinking* "SKIP" icon when you have selected them, one by one, for the Preferential Scan List.

When you *initiate memory scanning* on a channel with the blinking "SKIP" icon appended, *only* those channels bearing the blinking "SKIP" icon will be scanned.

Here is the procedure for setting up and using the Preferential Scan List:

- ① Press the [MHz] key momentarily to enter the Memory Recall mode, if you are not using memories already.
- ② Rotate the Main Dial knob to select a channel which you wish to add to the Preferential Scan List.
- ③ Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select "SKIP."
- ④ Press the [MHz] key, then rotate the Main Dial knob to select "ONLY."
- ⑤ Repeat this process for any other channels that you wish to add to the Preferential Scan List.
- ⑥ Press and hold in the [MHz] key to save the new settings and exit to normal operation.

You may now use the Main Dial knob to select any of the memory channels bearing the appended blinking "SKIP" icon. While listening on one of these channels, press the [UP] or [DWN] key to initiate scanning *only* on the channels on the Preferential Scan List.

To remove a channel from the Preferential Scan List, select "SKPOFF" in step ④ above.

Scanning

PROGRAMMABLE (BAND LIMIT) MEMORY SCAN (PMS)

This feature allows you to set sub-band limits for either scanning or manual VFO operation. For example, you might wish to set up a limit (in North America) of 144.300 MHz to 148.000 MHz so as to prevent encroachment into the SSB/CW “Weak Signal” portion of the band below 144.300 MHz.

Here’s how to do this:

- ① Using the techniques learned earlier, store (per the above example) 144.300 MHz into Memory Channel #L1 (the “L” designates the Lower sub-band limit).
- ② Likewise, store 148.000 MHz into Memory Channel #U1 (the “U” designates the Upper sub-band limit).
- ③ With any of these memories recalled, press the [MHz] key momentarily to activate the Programmable Band-Scan Limits. The “PMS” notation will appear at the left side of the display, reminding you that you are using the Programmable Band Limits.

The frequencies stored in memories “L” and “U” will now serve as tuning and scanning limits, thus creating a tuning sub-band.

To cancel the sub-band limits and return to normal memory operation, press the [D/MR] key momentarily.

Notes:

- ☐ If the frequency in memory channel “Lx” is equal to or greater than the frequency stored in memory channel “Ux,” you can not activate the PMS operation.
- ☐ Nine pairs of Band Limit memories, labeled L1/U1 through L9/U9 are available.
- ☐ PMS Band-Limit memories must be a multiple of 100 kHz (i.e. 144.300 MHz is OK, but 144.350 MHz is not).

BAND EDGE BEEPER

The **FT-1500M** can be set up to “beep” when a band edge is encountered during normal VFO tuning/scanning, limited-band PMS tuning/scanning, or at the end of each cycle of tuning or scanning of the memory channels.

The procedure for enabling the Band-Edge Beeper is:

- ① If scanning is in progress, halt the scanner by pressing the **PTT** switch momentarily.
- ② Press and hold in the [MHz] key for one second, then rotate the Main Dial knob to select “EDG BP.”
- ③ Press the [MHz] key, then rotate the Main Dial knob to select “EBP ON.”
- ④ Press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

Scanning

SMART SEARCH OPERATION

The Smart Search feature allows you to load frequencies automatically according to where activity is encountered by your radio. When Smart Search is engaged, the transceiver will search above and below your current frequency, storing active frequencies as it goes (without stopping on them even momentarily); these frequencies are stored into a special Smart Search memory bank, consisting of 31 memories (15 above the current frequency, 15 below the current frequency, plus the current frequency itself).

Two basic operating modes for Smart Search are available:

- SINGLE:** In this mode, the transceiver will sweep the current band once in each direction starting on the current frequency. All channels where activity is present will be loaded into the Smart Search memories; whether or not all 31 memories are filled, the search will stop after one sweep in each direction.
- CONT:** In this mode, the transceiver will make one pass in each direction as with One-Shot searching; if all 31 channels are not filled after the first sweep, however, the radio will continue sweeping until they are all filled.

Setting the Smart Search Mode

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "S SRCH."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired Smart Search mode (see above).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Storing Smart Search Memories

- ① Press the **[P2]** key*, then press the **[A]** key.
- ② The Smart Search process will now cause the radio to scan upward on current band, loading channels on which it encounters a signal strong enough to open the squelch.
- ③ Depending on the mode you set for Smart Search operation (**SINGLE** or **CONT**), the Smart Search scan will eventually terminate, and the LCD will revert to Smart Search Memory Channel "CH C" (the "Center" channel).
- ④ To recall the Smart Search Memories just stored, rotate the Main Dial knob or press the microphone's **[UP]** or **[DWN]** key.
- ⑤ If you find particular channels which you wish to store into the "regular" memory system, follow the memory storage procedures described on page 23.
- ⑥ Press the **[D/MR]** key momentarily to exit the Smart Search mode.

* The (user-programmable) **[P2]** key is set at the factory for Smart Search operation. It

Scanning

may be assigned to one of the other programmable keys, if you like. See page 19.

Note that these memories are so-called “soft” memories; they will be lost if you exit the Smart Search mode or initiate a new Smart Search sweep.

PRIORITY CHANNEL SCANNING (DUAL WATCH)

The **FT-1500M** scanning features include a two-channel scanning capability which allows you to operate on a VFO or Memory channel, while periodically checking Memory Channel 1 (the “Priority Channel”) for activity.

Here is the procedure for setting up and activating Priority Channel Dual Watch operation:

- ① First, you need to select which Memory channel will serve as the Priority Channel. Press the **[D/MR]** key momentarily to enter the Memory mode, if you are not using memories already. Also, if the “CH NUM” (“Memory Channel Numbering”) function is not active, set it to “ON” via the Menu system (see page 39). Now rotate the Main Dial knob to choose the channel which will be the Priority Channel, and make a note of its channel number.
- ② Press and hold in the **[D/MR]** key for one second (the channel number will blink), then rotate the Main Dial knob to return to the channel you selected as the Priority Channel in the previous step.
- ③ Press and hold in the **[D/MR]** key for one second; this locks in the newly-selected Priority Channel.
- ④ Now set the radio to the VFO, Memory, or Home Channel mode so as to select the channel on which you wish to operate.
- ⑤ Press and hold in the **[REV]** key for one second to start Priority Channel scanning (a small “PRI” notation will appear on the LCD).

During priority monitoring, the displayed frequency will shift to the Priority memory briefly about every five seconds, while the receiver checks for the presence of a signal. If a signal appears, the radio will hold on the Priority memory according to the setting of the Scan-Resume mode (see page 27).

So long as no signal appears on the Priority memory (causing the squelch to open), you can tune, transmit and receive on the VFO, or select and operate on other memories; however, you cannot scan (except manually, one step at a time, using the microphone’s **[UP]** and **[DWN]** buttons), as the scanning logic circuits are already dedicated to the priority scanning activities.

Scanning

PRIORITY REVERT MODE

During Priority channel operation (Dual Watch), a special feature is available which will allow you to move to the Priority Channel instantly, without waiting for activity to appear on the Priority Channel.

When this feature is enabled, and Priority monitoring is engaged, just press the microphone's **PTT** button. Operation will instantly revert to the Priority Channel.

To *enable* Priority Revert operation capability (it is not enabled from the factory):

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "RVRT."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select "ON."
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

To disable Priority Revert operation, select "OFF" in step ② above.

DTMF Operation

MANUAL DTMF TONE GENERATION

You can generate DTMF tones during transmission manually, for repeater access or autopatch operation.

- ① Press the **PTT** switch to begin transmission.
- ② While transmitting, press the desired numbers on the keypad.
- ③ When you have sent all the digits desired, release the **PTT** key.

DTMF AUTODIALER

Nine DTMF Autodialer memories are available on the **FT-1500M**. These DTMF Autodialer memories can store up to 16 digits of a telephone number, for repeater autopatch or other uses.

To load DTMF Autodialer memories, use following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "DT MEM."
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the DTMF Autodialer memory channel number into which you wish store a telephone number ("1" to "9").
- ③ Press the **[D/MR]** key momentarily.
- ④ Rotate the Main Dial knob to select the first digit of the telephone number you wish to store.
- ⑤ When you have selected the correct digit, press the **[REV]** key momentarily.
Now rotate the Main Dial knob to select the second of the 16 available numbers in the current DTMF Autodialer memory register.
- ⑥ Repeat this procedure for each digit in the telephone number.
- ⑦ When entry of all digits is complete, press the **[MHz]** key to save the new setting.
- ⑧ If you wish to store another DTMF string, repeat steps ② through ⑦ above.
- ⑨ When all required DTMF memories are filled to your satisfaction, press and hold in the **[MHz]** key for one second to save the new settings and exit to normal operation.

To transmit the memorized telephone number, use the following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select "DTMF."
- ② Press the **[MHz]** key momentarily, then rotate the Main Dial knob to select "DT ON," which enables the DTMF Autodialer for transmission.
- ③ Now press and hold in the **[MHz]** key momentarily to exit the Menu.
- ④ Press and hold in the **PTT** switch.
- ⑤ While still holding the **PTT** switch in, press the numbered key (**[1]** through **[9]**) corresponding to the DTMF Memory register you wish to send. To send the DTMF string stored in DTMF Channel 2, for example, hold in the **PTT** switch, and press the **[2]** key.

DTMF Operation

Once you have pressed the numbered key in the above step, you can release the **PTT** switch, as the Autodialer will transmit the remainder of the DTMF string automatically.

The speed at which the DTMF digits are sent can be changed. Two speed levels are available: Low (10 digits per second) and High (20 digits per second: default).

To toggle between Low and High speed, use the following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “DT SPD.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired speed: “50” (High speed) or “100” (Low speed).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

You can also set a longer delay between the time you press the numerical key (with **PTT** pressed) and the first DTMF digit is sent.

To set the delay time, use the following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “DT DLY.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select the desired speed (50/250/450/750/1000 ms).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to the normal operation.

Interface of Packet TNCs

The **FT-1500M** provides a convenient rear-panel DATA jack for easy TNC interconnections.

Packet operation generally requires only that you connect your TNC per the illustration on page 9, then configure the channel for 1200 bps or 9600 bps using the Menu (the default setting is 1200 bps, which is the more common data rate on the 144 MHz band). To select the Packet baud rate, use the following procedure:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “**P RATE**.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob, if necessary, to select “**1200**” or “**9600**” (bps).
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

Normally, the microphone will be cut off during packet transmission, so as to avoid interference to the data stream by voice input. However, this protection feature can be disabled, if you have some reason to want the microphone to be active during packet transmission.

To re-activate the microphone during packet transmission:

- ① Press and hold in the **[MHz]** key for one second, then rotate the Main Dial knob to select “**PCKT**.”
- ② Press the **[MHz]** key, then rotate the Main Dial knob to select “**PKT ON**.”
- ③ Press and hold in the **[MHz]** key for one second to save the new setting and exit to normal operation.

To disable the microphone during packet transmission (the typical configuration), select “**PKT OFF**” in step ② above.

Packet operating procedures are governed by the software used by your computer and TNC. Consult the documentation accompanying the software for details on packet operation.

Microprocessor Reset Procedures

MASTER RESET

To perform a CPU master reset for all memories and Menu settings:

- ① Turn the transceiver off.
 - ② Press and hold in the **[MHz]**, **[REV]**, **[LOW]**, and **[D/MR]** keys while turning the transceiver on.
 - ③ Once the radio comes on, release these four keys, then press the **[D/MR]** key again to initialize the transceiver.
-

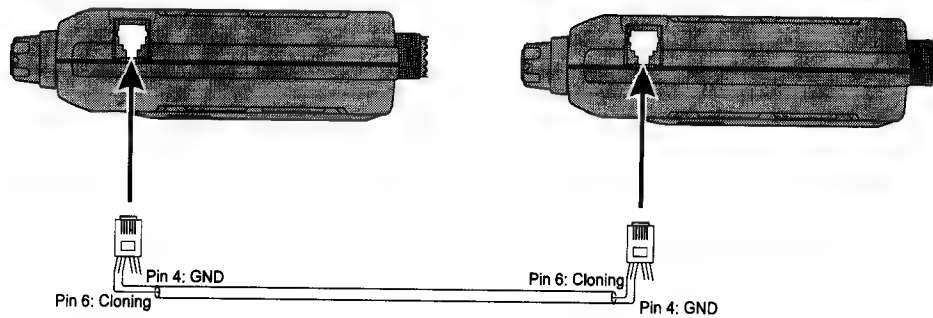
SET MODE RESETTING

To reset all Menu settings to their factory defaults, while leaving the memories unchanged:

- ① Turn the transceiver off.
- ② Press and hold in the **[REV]**, **[LOW]**, and **[D/MR]** keys while turning the transceiver on.
- ③ Once the radio comes on, release these three keys, then press the **[D/MR]** key again.

Cloning

You can transfer all data stored in one transceiver to another set by utilizing the handy “Cloning” feature. This requires a user constructed cloning cable which connects the MIC jacks on the two transceivers as shown below.



To clone from one transceiver to another, use the following procedure:

- ① Insert the Clone Cable into the MIC jack of each transceiver.
- ② Turn both transceivers off, then press and hold in the **[MHz]**, **[LOW]**, and **[D/MR]** keys on each radio while turning the power on again. The “CLONE” notation will appear on the display.
- ③ On the “destination” radio, press the **[D/MR]** button.
- ④ Now, on the “source” radio, press the **[MHz]** key. Data will now be transferred to the “Destination” radio from the “Source” radio
- ⑤ If there is a problem during the cloning process, “ERROR” will be displayed. Check your cable connections and try again.
- ⑥ If cloning is successful, turn the “destination” radio off. Now turn the “source” radio off.

Remove the clone cable. Channel and operating data for both radios are now identical. They both may be turned on now for normal operation.

Set (Menu) Mode

The FT-1500M's Menu system allows a number of transceiver operating parameters to be custom-configured for your operating requirements.

The Menu is easy to activate and set, using the following procedure:

- ① Press and hold in the [MHz] key for one second.
- ② Rotate the Main Dial knob to select the Menu item to be adjusted.
- ③ Press the [MHz] key, then rotate the Main Dial knob to adjust the status or value of the Menu item.
- ④ After completing your adjustment, press and hold in the [MHz] key for one second to save the new setting and exit to normal operation.

Menu items are conveniently arranged in alphabetical order.

Menu Selection Summary

Menu Items	Function	Available Settings	Default
ALPH	Store Alpha-Numeric "Tags"	—	—
APD	Set the Automatic Power-Off time	1~12 Hours, or OFF	OFF
ARS	Enable/disable Automatic Repeater Shift	ON/OFF	ON
BEEP	Enable/disable the Key/button beeper	ON/OFF	ON
BELL	Enable/disable the CTCSS Bell-ringer feature	OFF/1.3/5/5/REPEAT	OFF
CH NUM	Enable/disable the momentary display of the Memory Channel Number	ON/OFF	OFF
CK SET	Shifting of CPU clock frequency	ON/OFF	OFF
DC IN	Indicate the DC Supply Voltage	—	—
DIMR	Setting of the front panel display's illumination level	1~10 or OFF	10
DTMF	Enable/disable the DTMF Autodialer	ON/OFF	OFF
DT DLY	Setting of the DTMF Autodialer Delay Time	50/250/450/750/1000 ms	450 ms
DT MEM	Programming the DTMF Autodialer	—	—
DT SPD	Setting of the DTMF Autodialer Sending Speed	50/100 ms	50 ms
EDG BP	Enable/disable the Band-edge beeper	ON/OFF	OFF
LOCK	Enable/disable the Key/button Lock	KEY/DIA/K+D/PTT/K+P/ D+P/ALL/OFF	OFF
PCKT	Enable/disable the Microphone during Packet transmission	ON/OFF	OFF
P RATE	Set the transceiver's circuitry for the Packet baud rate to be used	1200/9600	1200
PRG P1	Programming the function assigned to microphone key 1	SQ/OFF/S SRCH/TONE/ T SRCH/T CALL/RPTR/ DC IN/DIMR/WX CH/SKIP	※
PRG P2	Programming the function assigned to microphone key 2		S SRCH
PRG P3	Programming the function assigned to microphone key 3		T SRCH
PRG P4	Programming the function assigned to microphone key 4		WX CH
REV/HM	Select the [REV] key function	REV/HOME	REV
RF SQL	Adjust the RF Squelch threshold level	1~10 or OFF	OFF
RPTR	Setting of the Repeater Shift Direction	DIMR/RPT/←RPT	DIMR
RVRT	Enable/disable the "Priority Channel Revert" feature	ON/OFF	OFF
SCAN	Select the Scan Resume mode	BUSY/HOLD/5SEC	BUSY
SHIFT	Set the magnitude of the Repeater Shift	0.00 ~ 99.95 MHz (only ±4 MHz will work)	600 kHz
SKIP	Enable/disable Skipping of a channel during scanning	OFF/SKIP/ONLY	OFF

Set (Menu) Mode

Menu Item	Function	Available Values	Default
SQUEL	Set the Squelch threshold	1 ~ 15 or OFF	1
STEP	Setting of the synthesizer steps used in VFO or Memory Tune operation	5/10/12 5/15/20/25/ 50/100 kHz per step	5
SSRCH	Select the Smart Search Sweep mode	SINGLE/CONT	SINGLE
TSQ	Select the CTCSS mode	OFF/T/TSQ	OFF
TN FREQ	Setting of the CTCSS Tone Frequency	50 Standard CTCSS Tones	100.0 Hz
TOT	Set the time-out limit for the Time-Out Timer	1 ~ 60 minutes, or OFF	6 minutes
W/N DV	Transmitter Microphone Gain and Deviation reduction	NARROW/WIDE	WIDE

※ Depends on the transceiver version

Set Mode Details

Set Item [ALPH]

Function: Programming an Alpha/Numeric label for a memory.

See page 24 for details.

Set Item [APO]

Function: Enable/Disable the Automatic Power Off feature.

Available Values: 1 ~ 12 Hours, or OFF

Default: OFF

Set Item [ARS]

Function: Enable/Disable the Automatic Repeater Shift function.

Available Values: ON/OFF

Default: ON

Set Item [BEEP]

Function: Enable/Disable the Key/button beeper.

Available Values: ON/OFF

Default Setting: ON

Set Item [BELL]

Function: Enable/Disable the CTCSS Bell Paging feature.

Available Values: OFF/1/2/5/R/RPT

Default Setting: OFF

Set Item [CH NUM]

Function: Enable/Disable the momentary display of the Memory Channel Number as the Main Dial knob is rotated.

Available Values: ON/OFF

Default Setting: OFF

Set (Menu) Mode

Set Item [CK SFT]

Function: Shifting of CPU clock frequency, in order to shift any possible spurious responses (“birdies”) off a desired channel.

Available Values: ON/OFF

Default Setting: OFF

Set Item [DC IN]

Function: Indicates the DC Supply Voltage.

Set Item [DIMR]

Function: Setting of the front panel display’s illumination level.

Available Values: 1 ~ 10 or OFF

Default Setting: 10

Set Item [DTMF]

Function: Enable/Disable the DTMF Autodialer

Available Values: ON/OFF

Default Setting: OFF

Set Item [DT DLY]

Function: Setting of the DTMF Autodialer Delay Time

Available Values: 50/250/450/750/1000 ms.

Default Setting: 450 ms.

Set Item [DT MEM]

Function: Programming the DTMF Autodialer Memories. See page 33.

Set Item [DT SPD]

Function: Setting of the DTMF Autodialer Sending Speed

Available Values: 50/100 ms.

Default Setting: 50 ms (high speed)

Set Item [EDG BP]

Function: Enable/Disable the Band-edge beeper.

Available Values: ON/OFF

Default Setting: OFF

Set Item [LOCK]

Function: Enable/Disable the key/button Lock

Available Values: KEY/DIA/K+D/PTT/K+P/D+P/ALL/OFF

Default Setting: OFF

Set (Menu) Mode

Set Item [PCKT]

Function: Enable/Disable the Microphone during Packet transmission.

Available Values: ON/OFF

Default Setting: OFF

Set Item [P RATE]

Function: Set the transceiver's circuitry for the Packet baud rate to be used.

Available Values: 1200/9600 bps

Default Setting: 1200

Set Item [PRG P1]

Function: Programming the function assigned to microphone key [P1]

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/
WX CH/SKIP

Default Setting: Depends on transceiver version.

Set Item [PRG P2]

Function: Programming the function assigned to microphone key [P2]

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/
WX CH/SKIP

Default Setting: S SRCH (Smart Search)

Set Item [PRG P3]

Function: Programming the function assigned to microphone key [P3]

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/
WX CH/SKIP

Default Setting: T SRCH (Tone Search)

Set Item [PRG P4]

Function: Programming the function assigned to microphone key [P4]

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/
WX CH/SKIP

Default Setting: WX CH (Weather Channel Bank)

Set Item [REV/HM]

Function: Select the [REV] key function.

Available Values: REV/HOME

Default Setting: REV

Set Item [RF SQL]

Function: Adjust the RF Squelch threshold level.

Available Values: OFF/1 to 10

Default Setting: OFF

Set (Menu) Mode

Set Item [RPTR]

Function: Setting of the Repeater Shift Direction

Available Values: SIMP/-RPT/+RPT

Default Setting: SIMP

Set Item [RVRT]

Function: Enable/Disable the “Priority Channel Revert” feature

Available Values: OFF/ON

Default Setting: OFF

Set Item [SCAN]

Function: Select the Scan Resume mode.

Available Values: BUSY/HOLD/5SEC

Default Setting: BUSY

Set Item [SHIFT]

Function: Set the magnitude of the Repeater Shift

Available Values: 0.00 ~ 99.95 MHz (only shifts of less than 4 MHz will work)

Default Setting: 600 kHz

Set Item [SKIP]

Function: Enable/Disable Skipping of a channel during scanning.

Available Values: SKIP/ONLY/OFF

Default Setting: OFF (Stop on busy channel)

Set Item [SQL]

Function: Set the Squelch threshold

Available Values: OFF/1 ~ 15 (arbitrary scale)

Default Setting: 1

Set Item [STEP]

Function: Setting of the synthesizer steps used in VFO/Memory Tune operation.

Available Values: 5/10/12.5/15/20/25/50/100 kHz per step

Default Setting: Depends on the transceiver version.

Set Item [S SRCH]

Function: Select the Smart Search Sweep mode.

Available Values: SINGLE/CONT

Default Setting: SINGLE

Set Item [TONE]

Function: Select the CTCSS mode.

Available Values: OFF/T/TSQ

Default Setting: OFF

Set (Menu) Mode

Set Item [TN FRQ]

Function: Setting of the CTCSS Tone Frequency.

Available Values: 50 standard CTCSS Tones

Default Setting: 100.0 Hz

Set Item [TOT]

Function: Set the time-out limit for the Time-Out Timer

Available Values: 1 ~ 60 minutes, or OFF

Default Setting: 6 minutes

Set Item [W/N DV]

Function: Reduction of the Transmitter Microphone Gain and Deviation

Available Values: WIDE/NARROW

Default Setting: WIDE (± 5 kHz Deviation, 15 kHz bandwidth)

Specifications

GENERAL

Frequency Range:	TX: 144 - 146 or 144 - 148 MHz RX: 144 - 146 or 137 - 174 MHz
Channel steps:	5, 10, 12.5, 15, 20, 25, 50 & 100 kHz
Frequency Stability:	Better than ± 10 ppm (-20° to $+60^{\circ}\text{C}$)
Standard repeater shift:	± 600 kHz
Mode of Emission:	F2, F3
Antenna Impedance:	50 Ω , unbalanced
Supply voltage:	13.8 VDC ($\pm 10\%$), negative ground
Current consumption (typical):	RX: less than 0.7A (max. signal) less than 0.3A (squelched) TX: 8 A (50W)/6 A (25W)/3A (10W)/2A (5W)
Operating Temperature Range:	20° to $+60^{\circ}\text{C}$ (4° to $+140^{\circ}\text{F}$)
Case size (WHD):	127 x 35 x 126 mm (5 x 1.4 x 5 inch) (w/o knobs & connectors)
Weight (approx.):	1 kg (2.2 lb.)

TRANSMITTER

Output Power:	50 W/25W/10W/5W
Modulation Type:	Variable Reactance
Maximum deviation:	± 5 kHz/ ± 2.5 kHz
Spurious Radiation:	better than -60 dB
Microphone Impedance:	2-k Ω

RECEIVER

Circuit type:	Double-conversion superheterodyne
Intermediate Frequencies:	21.7 MHz & 450 kHz
Sensitivity (for 12dB SINAD):	better than 0.2 μV
Selectivity ($-6/-60\text{dB}$):	12 kHz/28 kHz
IF Rejection:	better than 70 dB
Image Rejection:	better than 70 dB
Maximum AF Output:	3.5 W @4 Ω for 10% THD

Specifications subject to change without notice or obligation.

Specifications guaranteed only within the amateur band.

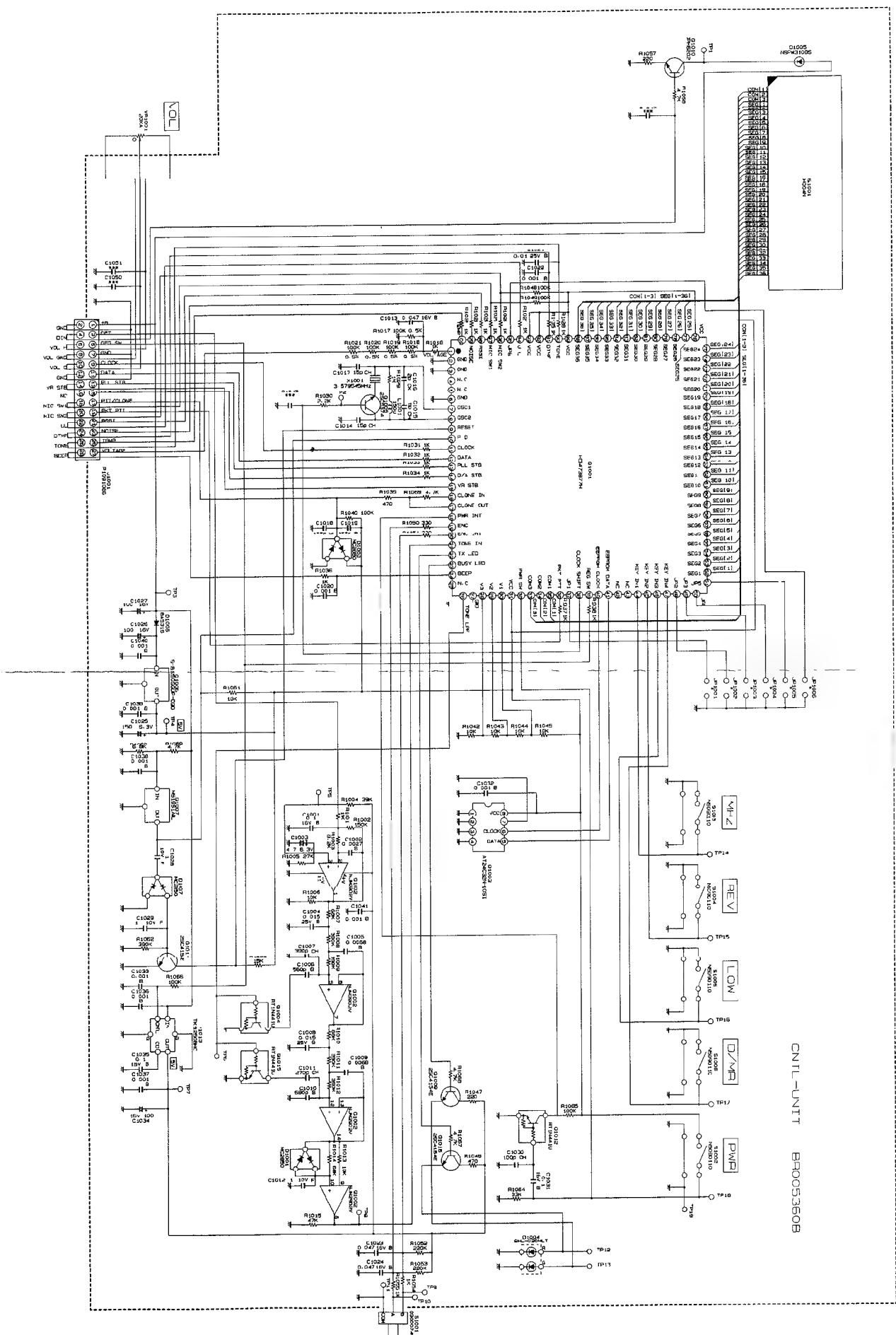
Frequency range and repeater shift may vary according to local requirements and regulations

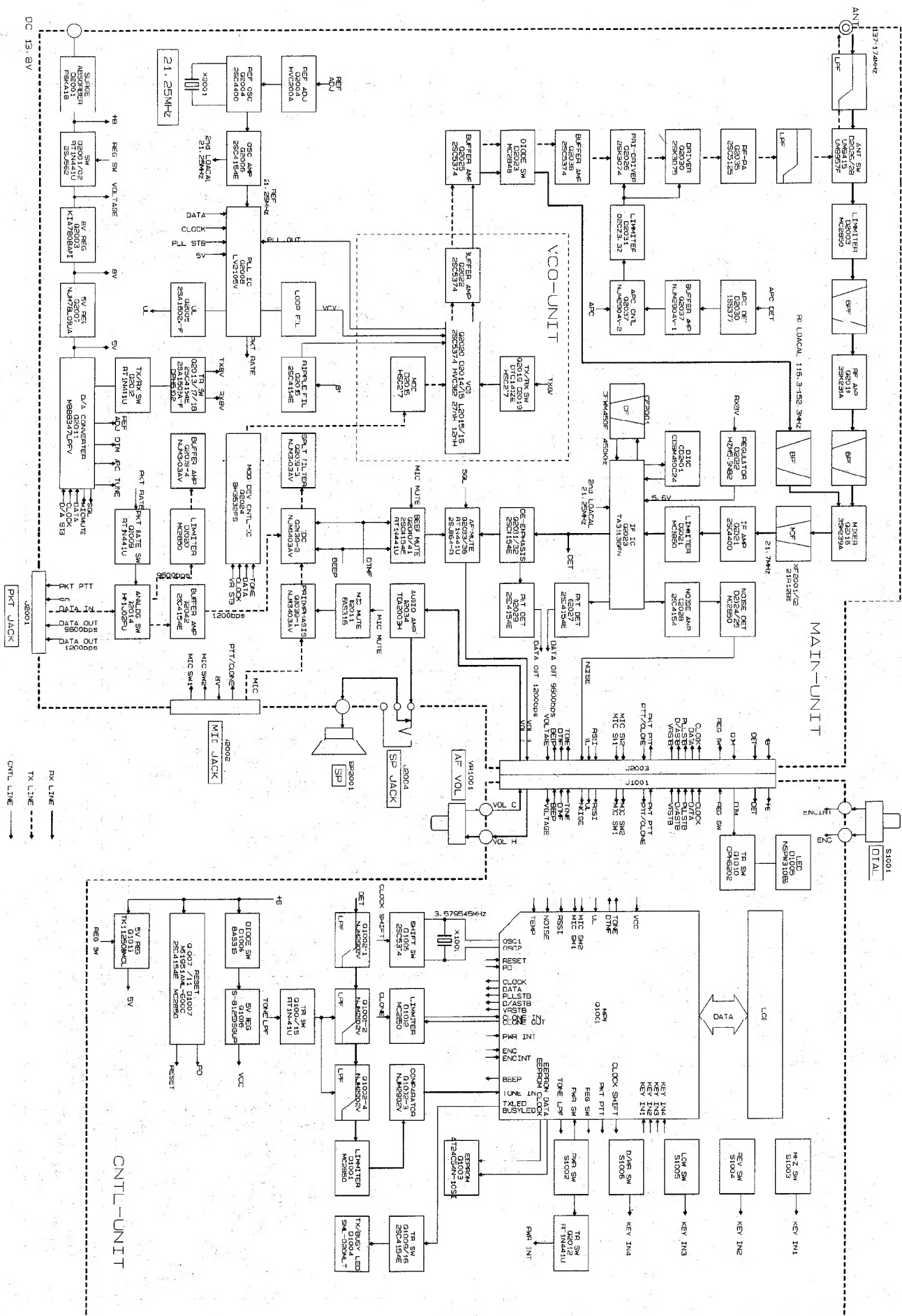
1. Changes or modifications to this device not expressly approved by Yaesu Musen could void the user's authorization to operate this device.
2. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions; (1) this device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation.
3. The scanning receiver in this equipment is incapable of tuning, or readily being altered, by the User to operate within the frequency bands allocated to the Domestic public Cellular Telecommunications Service in Part 22.

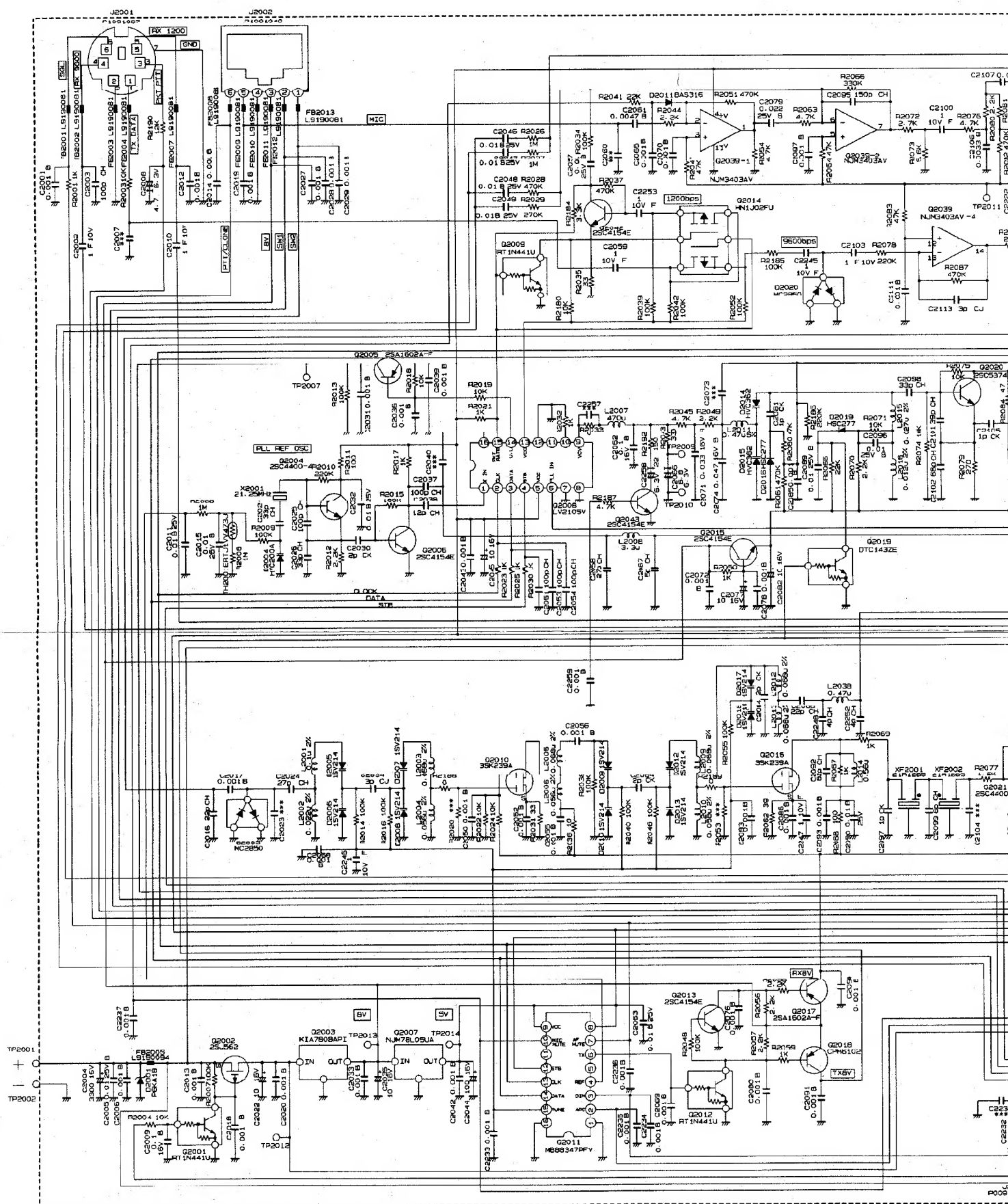
This device complies with RSS-210 of Industry Canada. Operation is subject to the following two conditions; (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesirable operation of the device.

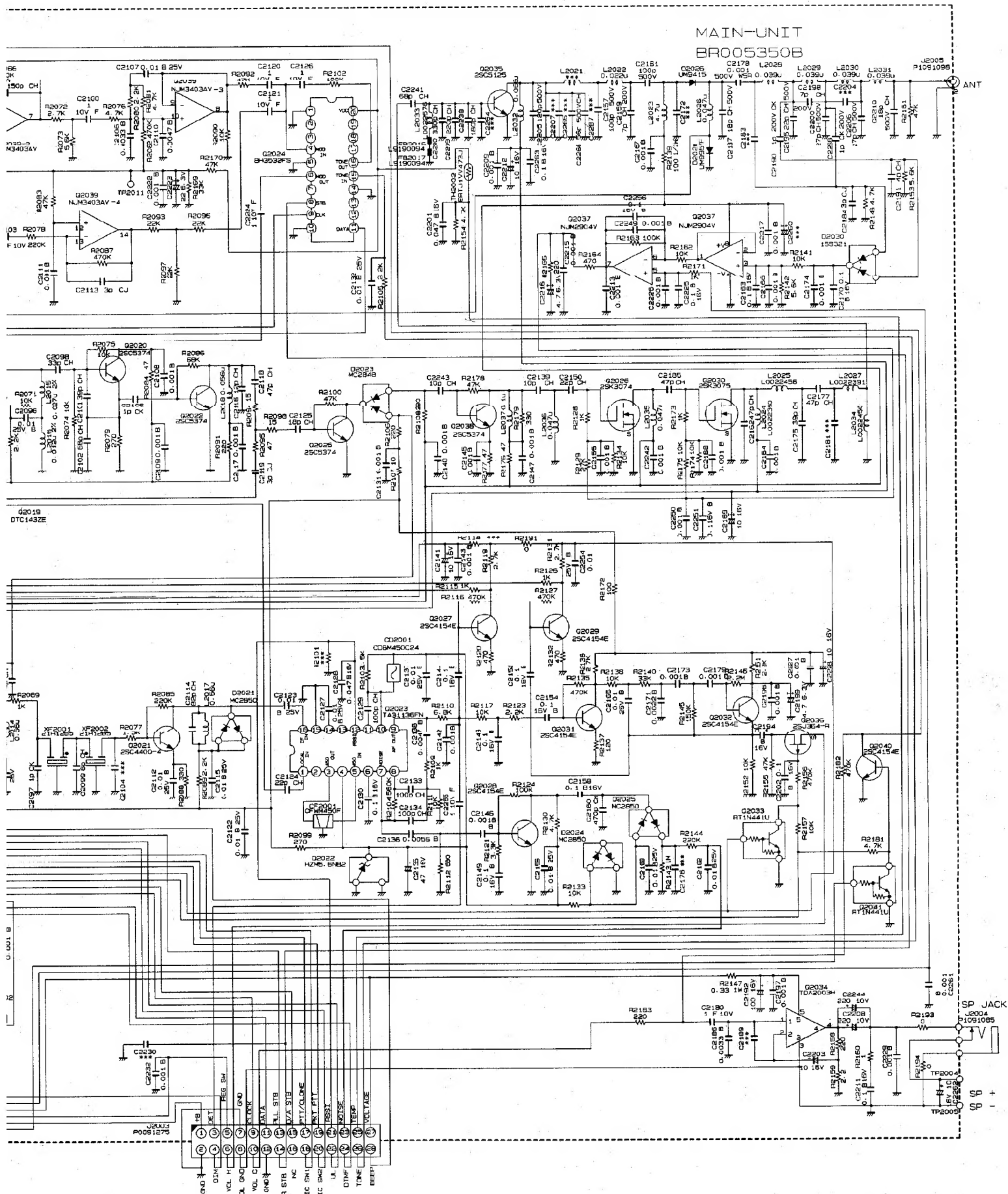
WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.

FT-1500M Circuit Diagram











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